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Tikoudis, I.

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To Vasiliki Tosounidou (1935), with the wish to reach the age of one hundred and sing the songs she hasn't sang.

Στη Βασιλική Τοσουνίδου (1935), με την ευχή να φθάσει τα εκατό και να τραγουδήσει τα τραγούδια που δεν τραγούδησε.

Preface

Had the story behind this thesis been narrated in reverse, it would start with a realization. What I have been told once, namely that *every sentence is a new struggle*, does not only hold for scientific writing; it rather extends to all types of written expression, including an organized attempt to thank and honor the people that motivated, inspired or helped throughout this work.

Reaching these lines I felt indebted, as I have many times been in the past, to my supervisors; two very different, but equally fair men. Erik Verhoef has played a major role in the formation of the research questions in most of the chapters and been a constant source of insights, most of which proved particularly useful, not only to keep the work going on the right track but also to mitigate the usual worries of a PhD candidate. But most important, I feel very lucky to have shared the numerous small thrills research has given me so far with someone who has been a model to me and many others, a very pleasant person that values surprise and is willing to give up lots of time in order to dig under it. My ultimate hope is that we are going to share many more such surprises and thrills in the years to come.

At the outset of this work, I thought that time would suffice for a joint empirical contribution with Jos van Ommeren to be incorporated in this dissertation. Unfortunately, my initial calculation was wrong and the lucid dream of structurally estimating one of the models included in this thesis has been postponed for the future. Despite this, Jos has shaped the work in Chapters 2 and 3 directly, by participating in the formation of the research questions and by reviewing the draft versions. In addition, his supervising footprint is indirectly present in the rest of the material. Jos helped me change my perspectives on scientific writing and reconsider my ways on evaluating the special weight of a research question, something that is particularly appreciated.

My interest in large scale simulation modeling ignited in 2009, while being a researcher in the Royal Institute of Technology (KTH). Being exposed to such models, I reconciled with the idea that a world constructed out of zeros and ones would not be such a horrible place to explore for a few years, and started scratching the surface below them. I was trying to figure out what Object-Oriented Programming – the thing Anders Karlström was talking so much about – really is, when someone invigorated further my interest: "Do you remember Sim-city, bro"? I was later given the choice between working on a time valuation study and large-scale spatial simulation modeling. At that time, long before I knew what debugging is, someone in KTH calculated that the time he had spent debugging his code during his PhD was enough to cross the Pacific Ocean all the way from New Zealand to Alaska with a canoe. Having made the latter choice, I can today confirm that such calculations make perfect sense.

Soon after the beginning of my research journey I crushed, full throttle, in a world dominated by analytical proof droughts, numerical complexity and slow convergence melancholy. I realized that I was throwing stones to the moon, with the hope to land it somewhere on the snowcapped woods behind KTH. On the way I met Per Olsson, from whom I first heard about the big-O

notation and got lots of nice tips on coding. The joint work with Marcus Sundberg and Anders Karlström (*Journal of Transport and Land Use*, 2011) as well as the collaboration with Apostolos Baltzopoulos and Pontus Braunerhjelm (*Journal of Economic Geography*, 2015) yielded the two aforementioned contributions that could not, unfortunately, be incorporated in this book due to the lack of coherence with the rest of the material. Lars-Göran Mattsson provided unforgettable guidance at the most difficult moments, teaching tips and -very important- rare information over the lives and films of Ingmar Bergman and Andrei Tarkovsky. One afternoon, after a long TA session in a classroom resembling an exhibition of stuffed animals and fossils, I run into a fresh paper by Alex Anas and Yu Liu (2007). It looked fairly complex; but in the silent Swedish winter clock hands drag like frozen turtles, so there would be plenty of time..

A large part of this dissertation has been influenced by Anas and Liu (2007), but also from the several earlier contributions of Alex Anas on the urban general equilibrium. While being a PhD candidate, I had the chance to meet Alex and initiate a joint methodological contribution on the so-called "Anas-type" of models, presented in Chapter 4. Another part of this work has been influenced by the numerical monocentric city model of Erik Verhoef (2005). Soon after I commenced on my PhD in VU, in late 2011, while working on a variation of that model, I discovered that debugging was working much better around midnight, when everything is quiet and distractions are scarce. So I designed a diversion from my ordinary sleeping patterns, to find out that this would not only boost coding efficiency, but it would also be the most effective way to communicate the progress with Erik Verhoef, who replied fast to most of my coffee-stained e-mails during the small hours.

The rest of the work was carried out in VU Spatial Economics, a place of smiling, kind and insightful people. Special mention should be made to the pleasant colleagues with who I shared initially an ordinary office (Kristian Behrens and Michiel Gerritse) and later on a fancy workspace resembling a large fish tank (Martin Adler, Hugo Silva, Maria Dementieva and Masood Gheasi). My memories have been nuanced with the sweet sounds of late night jazz in the bars of New Orleans and the colorful images from the cotton fields of South-East US, all curved in my mind during a road trip following NARSC 2013 conference, together with Hans Koster, Martin Adler and Martijn Kobus; the weekend bike trips in the Dutch meadows with Department colleagues; the kind help of Elfie Bonke and Jenny Wiersema in multiple instances, which I hope to gradually reciprocate with donkey-depicting postal cards I will be sending to VU every time I have the chance; the vivid, generous personality of Alexandros Dimitropoulos, who has been laughing with my clumsy jokes during the evening training sessions at the VU Sportcentrum; the mutual brainstorming with the curious nature of the fellow-PhD student in VU operations research, Christos Orlis; the company of dear friends Nikolaos Tsilimponis and Albertine Oei; and, very important, the prompting words from family members throughout these years.

While being a PhD candidate, I spent a lot of time thinking how the policy relevance of this work could be maximized. One day in Spring 2015 I got a phone call from Walid Oueslati, who informed me about the outcome of the OECD's biennial Young Professional competition. I am grateful for his trust, from my first day in the OECD, his guidance and for his interest in this thesis, especially Chapter 5 which constituted the basis for the prototype version of a fully operational simulation model we designed together, MOLES (Multi-Objective Local Environmental Simulator).

Finally, I would like to express my gratitude and appreciation to the members of the PhD committee, for taking up the time to read the dissertation and provide useful comments.

Reaching the end of this note, I am in a state of contentment to have been given a fair chance in order to conduct PhD research in a topic that captured me, and to have met the aforementioned people, as well others whose help or influence is paper-specific and thus acknowledged in the beginning of each corresponding chapter. The endeavor was totally worth, not only because of the destination, but also because the route into the interior of the wonderland was unexpectedly fun. Unfortunately, the guy I was when I commenced on this journey isn't aware that he is crossing his own private Ithaca every single moment on the way to it; or that the cure to everything is salt water, even uncharted. But until the day time will start running backwards there is very little to do about it, apart from thanking the people that facilitated, one way or another, my first steps into this fancy, transcendental, violent, wonderful world of research; and then wait; a long – perhaps very long – time, until our worries become tiny clouds in an otherwise spotless sky.